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REMARKS

Claims 1-21, 24-27, and 37-43 are currently pending in the present application and are presently under consideration. All pending claims with status identifiers are found at pages 2-6.

Favorable reconsideration is requested in view of the comments below.

I. Rejection of Claims 1-12, 14-21, and 24-27 under 35 U.S.C. §103(a)

Claims 1-12, 14-21, and 24-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dunphy, *et al.* (U.S. 5,399,854) in view of Kersey, *et al.* (U.S. Patent 5,361,130) and Thomas, *et al.* (U.S. 4,460,893). Reconsideration and allowance of claims 1-12, 14-21, and 24-27 is respectfully requested for at least the following reasons. There is no suggestion or motivation to combine Dunphy, *et al.*, Kersey, *et al.*, and Thomas, *et al.* Further, the cited references, individually or in combination, do not teach or suggest all the limitations of the claimed invention.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, *there must be some suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, *to modify the reference or to combine reference teachings*. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) *must teach or suggest all the claim limitations*. See MPEP §706.02(j) (emphasis added). The teaching or suggestion to make the claimed combination and the reasonable expectation of success *must both be found in the prior art and not based on applicant's disclosure*. See *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

With respect to independent claims 1, 16, and 24, Dunphy, *et al.*, Kersey, *et al.*, and Thomas, *et al.*, alone or in combination, do not disclose, teach, or suggest an *optical fiber embedded in a bearing* as claimed. The present invention as recited in these claims employs an *optical fiber embedded in a bearing* to facilitate *determining a state of at*

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***least one condition of the bearing.*** As described previously, the ***embedded optical fiber*** can be employed to determine wear of a babbitt within a bearing, state of lubrication, temperature within the bearing, *etc.*

The optical sensor disclosed in Dunphy, *et al.* is not embedded within a bearing. Moreover, nowhere does Dunphy, *et al.* suggest that such optical sensor should (or even could) be ***embedded within a bearing*** as claimed. The optical fiber disclosed by Dunphy, *et al.* is embedded within a plurality of layers, wherein the layers include filaments and resin that have disparate thermal expansion coefficients. (*See abstract*). These filaments must be arranged in particular manners for the optical sensor to operate properly. (*See col. 4, lines 33-46*). Upon alterations of stress upon the sensor, a strong differential strain is imposed upon the optical fiber *via* the filaments, and a birefringence is induced within a portion of the optical fiber (*e.g., the grating*). Likewise, an alteration in temperature associated with the optical sensor induces birefringence within the optical fiber. This birefringence can be monitored to determine stress and/or temperature relating to the optical sensor. Again, however, there is no teaching or suggestion relating to ***embedding an optical fiber within a bearing*** as recited in the subject claims. Rather, the optical fiber is disclosed as being within a structure that includes a plurality of layers that comprise filaments that are arranged in a particular manner. Bearings do not include such layers, and thus Dunphy, *et al.* cannot suggest that such optical fiber be ***embedded within a bearing*** as claimed. Moreover, embedding the entire structure (including the multiple layers) within a bearing would be impractical, and is further not suggested within Dunphy, *et al.*

As noted, Kersey, *et al.* teaches an optical system that senses changes in environmental conditions or physical phenomena. Kersey, *et al.* employs an optical fiber to provide broadband light to a sensor, which measures environmental conditions or physical phenomena according to the received light wave. The sensor then relays sensed parameters in the form of a return light wave to a signal processor, which determines a measurement value based at least in part upon the returned light wave. Like Dunphy, *et al.*, Kersey, *et al.* fails to teach or suggest an ***optical fiber embedded in a bearing*** as recited in these claims. Moreover, Kersey, *et al.* provides no motivation for ***embedding an optical fiber in a bearing***.

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Thomas, *et al.*, like Dunphy, *et al.* and Kersey, *et al.*, does not disclose, teach, or suggest *an optical fiber embedded in a bearing* as recited in the aforementioned independent claims. Rather, Thomas, *et al.* discloses utilization of a *thermocouple* to sense temperature close to a maximum load-bearing point. (See col. 3, lines 30-33). Moreover, Thomas, *et al.* nowhere discloses, teaches, or suggests that *an optical fiber be embedded within a bearing*, much less the optical sensor of Dunphy, *et al.*

The Federal Circuit requires the Examiner to show a motivation to combine the references to create the case of obviousness. That is, *the Examiner must show reasons that the skilled artisan*, confronted with same problems as the inventor and with no knowledge of the claimed invention, *would select the elements from the cited prior art references for combination in the manner claimed*. See *In re Rouffet, supra* at 1357 (emphasis added). *The prior art items themselves must suggest the desirability and thus the obviousness of making the combination* without the slightest recourse to the teachings of the patent or application. Without such independent suggestion, the prior art is to be considered merely to be inviting unguided and speculative experimentation which is not the standard with which obviousness is determined. *Amgen, Inc. v. Chugai Pharmaceutical Co. Ltd.*, 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir. 1991); *In re Laskowski*, 871 F.2d 115, 117, 10 USPQ2d 1397, 1398 (Fed. Cir. 1989); *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1532 (Fed. Cir. 1988); *Hodosh v. Block Drug*, 786 F.2d at 1143 n. 5., 229 USPQ at 187 n. 4.; *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1985) (emphasis added).

The Examiner has failed to show that a skilled artisan would select the optical sensor of Dunphy, *et al.* and *embed it within a bearing*, as there is no motivation to complete such an embedding *within the cited references*. Particularly, the Examiner states that "at the time of the invention, one of ordinary skill in the art would have replaced the sensor of Thomas with the fiber optic sensor of Dunphy in order to have a simpler sensor having a wider range of temperature measurement, and also measures temperature more accurately." Nowhere in the cited references is there any indication that the optical sensor of Dunphy, *et al.* measures temperature more accurately and with a

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wider range than the thermocouple of Thomas, *et al.* Further, there is no evidence that the optical sensor of Dunphy, *et al.* is less complex than the thermocouple of Thomas, *et al.* (e.g., the optical sensor of Dunphy, *et al.* requires layers of resin and patterned graphite filaments to operate correctly). Moreover, there is no indication within Dunphy, *et al.* that a utilization of the aforementioned optical sensor in connection with a bearing was contemplated. Accordingly, the rationale proffered to combine such teachings is to achieve benefits identified in applicant's specification, to overcome problems associated with conventional methods, *etc.* Applicant respectfully submits that this is an unacceptable and improper basis for a rejection under 35 U.S.C. §103. In essence, the Examiner is basing the rejection on the assertion that it would have been obvious to do something not suggested in the cited references because so doing would provide advantages stated in Applicant's specification.

Similarly, none of the cited references disclose or suggest *an end of an optical fiber being flush with a contacting surface of a bearing*, and similarly there lacks motivation *within such references* to place *an optical fiber flush with a contacting surface of a bearing* as claimed. The Examiner states that it would be desirable to place the sensor as close as possible to a load bearing point. This may be true – however, a thermocouple placed flush with a contacting surface of a bearing would render such thermocouple inoperable. Therefore, while it may be desirable to place the sensor “in close proximity to the maximum load-bearing point”, Thomas, *et al.* does not disclose, teach, or suggest that a sensor be placed *flush with a contacting surface of the bearing* as claimed. Similarly, Dunphy, *et al.* nowhere teaches that the disclosed optical sensor be placed *flush with a contacting surface of a bearing* as recited in independent claim 16. Accordingly, there is no motivation *within the cited references* to place *an optical fiber being flush with a contacting surface of a bearing*.

Accordingly, in view of at least the above, it is readily apparent that the rejection of independent claims 1, 16, and 24, and dependent claims 2-11, 17-21, and 25-26, which respectively depend therefrom, should be withdrawn.

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**II. Rejection of Claims 13, 27, and 37-43 under 35 U.S.C. §103(a)**

Claims 13, 27, and 37-43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dunphy, *et al.* in view of Kersey, *et al.* and Thomas, *et al.* and further in view of Ide (US Patent 5,382,097). Reconsideration and allowance of claims 13, 27, and 37-43 is respectfully requested for at least the following reasons. Claims 13 and 27 depend upon independent claims 1 and 24, which are believed to be in condition for allowance. Accordingly, this rejection is moot. Independent claim 37, like independent claims 1, 16, and 24, includes *an optical fiber embedded in a bearing* as an element. Ide is directed towards a thrust bearing that includes a carrier and a number of bearing pads supported in the carrier. Ide, like Dunphy, *et al.*, Kersey, *et al.*, and Thomas, *et al.*, fails to teach or suggest *an optical fiber imbedded in a bearing* as recited in independent claim 37. Accordingly, this rejection should be withdrawn.

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**III. Conclusion**

The present application is believed to be condition for allowance in view of the above comments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,

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